



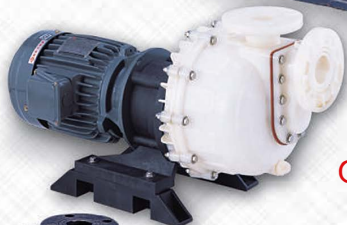
60 Hz

Chemical Pump

ELECTRIC PUMP



GPL



GPD - F



GPD



GPE - F



GPE



GPEB



ISO-9001/CNS12681





G.P.T.CO

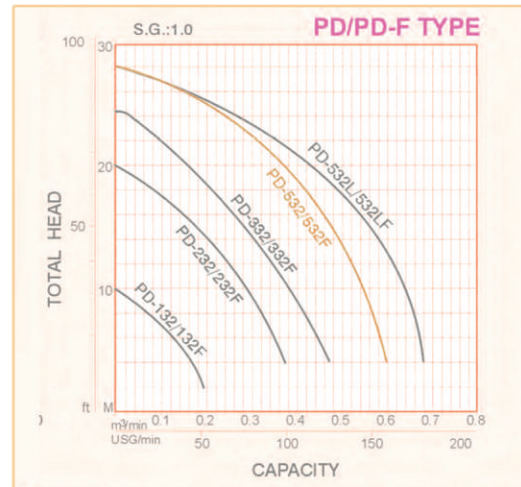
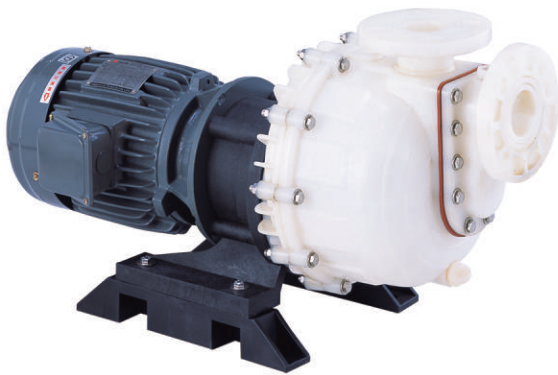
GPD/GPD-F

Self-Priming
Chemical Pump

GPD TYPE (FRPP)



GPD-F TYPE (PVDF)



| TYPE | | S.G | MOTOR | | | | PUMP | | | | Weight kg | Height mm | Width mm | Length mm |
|--|-----------|-----|-------|------|-------|---------|------------|----|----------|----------|--------------|--------------|-------------|--------------|
| FRPP | PVDF | | POWER | | Phase | Volt | Disch.Dia. | | Max.Head | Max.Flow | | | | |
| | | | HP | kw | PH | V | inch | mm | M | m³/min | | | | |
| PD/PD-F SELF-PRIMING CHEMICAL PUMP- FRPP/PVDF | | | | | | | | | | | | | | |
| GPD-132 | GPD-132F | 1 | 1 | 0.75 | 3 | 220-480 | 15 | 40 | 10 | 0.19 | 30 | 374 | 265 | 625 |
| GPD-232 | GPD-232F | 1 | 2 | 1.5 | 3 | 220-480 | 15 | 40 | 20 | 0.38 | 37 | 374 | 265 | 704 |
| GPD-332 | GPD-332F | 1 | 3 | 2.2 | 3 | 220-480 | 2 | 50 | 24 | 0.48 | 40 | 374 | 265 | 704 |
| GPD-532 | GPD-532F | 1 | 5 | 3.7 | 3 | 220-480 | 2 | 50 | 28 | 0.60 | 69 | 420 | 265 | 780 |
| GPD-532L | GPD-532LF | 1 | 5 | 3.7 | 3 | 220-480 | 3 | 80 | 28 | 0.68 | 70 | 425 | 265 | 830 |

- * Equipped with Teflon Bellow Seal
- * The weight of motor are not included.
- * Especially design for electroplating industries.
- * The motors of PUPL-F need to be ordered separately.



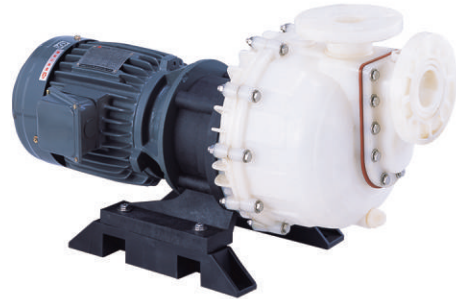
G.P.T. CO

GPD/GPD-F

Tough Construction against High Corrosive and High Temperature Chemical Liquids by adopting self-cooling design **"TEFLON BELLOW SEAL"**.



GPD Type (PVDF)



GPD-F Type (PVDF)

Material:

Gol pump provides FRPP and PVDF pump body to meet customer's requirement.

FRPP : Fiber Reinforced Polypropylene.

| | | |
|-----------------------------|------|------------|
| Operating temperature range | FRPP | 0°C~90°C |
| | PVDF | -20°C~95°C |

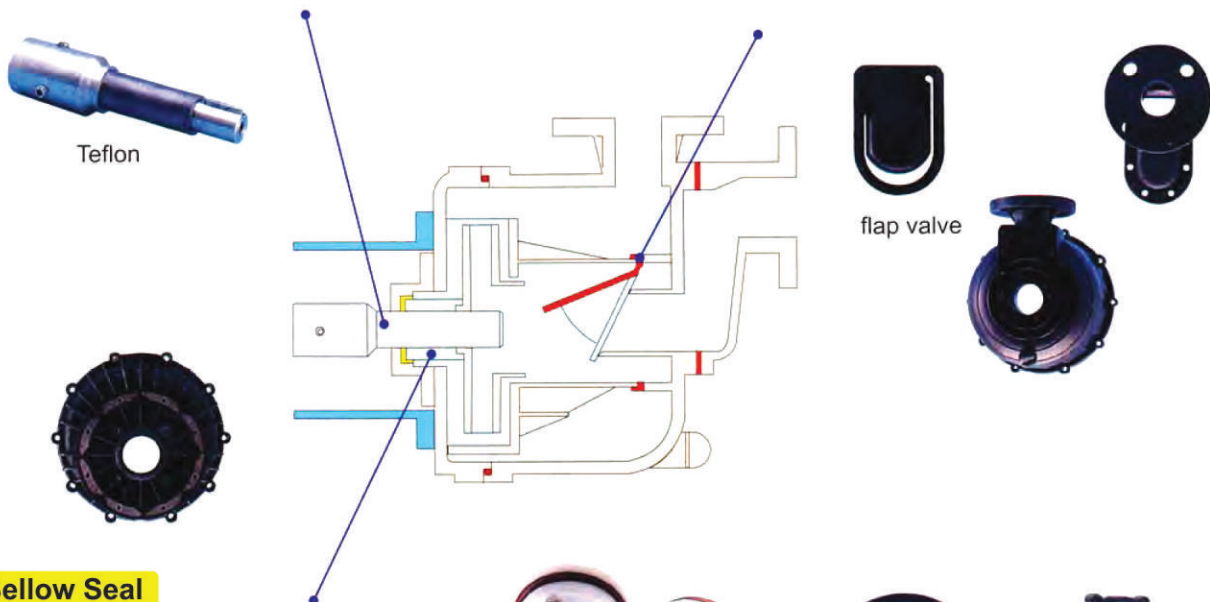
FEATURES

Special main shaft

The sus304 main shaft are covered with Teflon to resist high corrosive chemical liquids

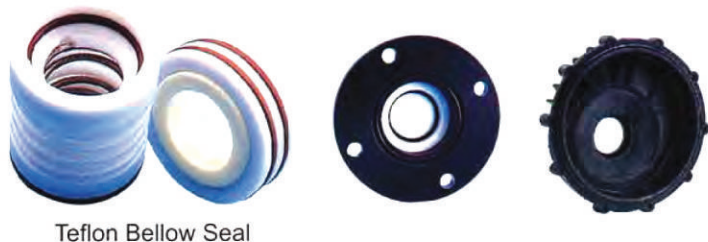
Self-priming ability

Excellent self-priming ability can suck the liquid up to 6 meter, and the flap valve design can prevent liquid back flow to maintain the flow rate



Teflon Bellow Seal

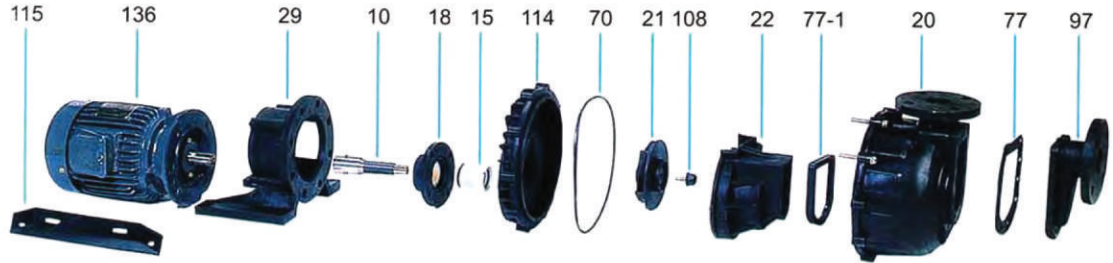
Adopting "Teflon Bellow Seal" and Superior anti-corrosive construction to correspond most of chemical liquids such as strong acid and alkali. and the "pump lower cover" adopting with self-cooling design to prevent the "Teflon below seal" from damage.





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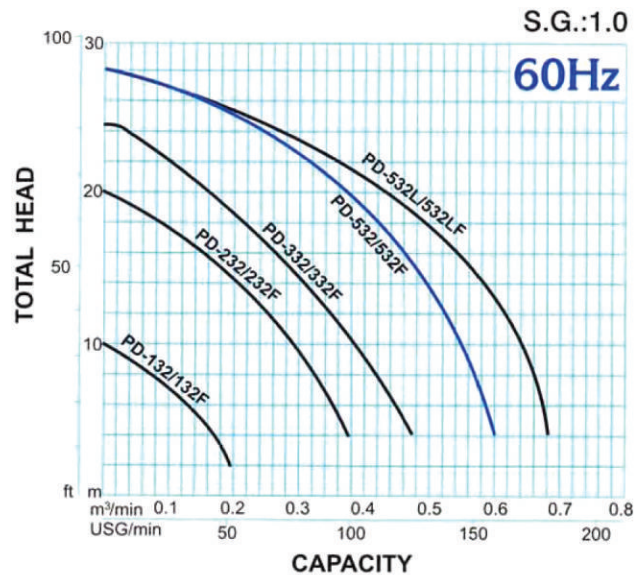
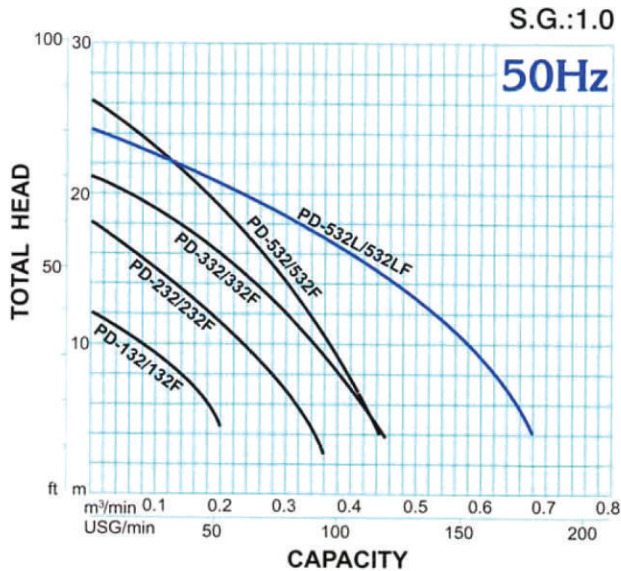
GPD/GPD-F



GPD-GPD-F Type SPECIFICATIONS

| Hz | Type | | S.G | Motor | | | Pump | | | | Weight kg | Height mm | Pump Dia mm |
|----|----------|-----------|-----|---------|-------|---------|-------------------|--------------------|-----------|---------------------|--------------|--------------|-------------------|
| | FRPP | PVDF | | Power | Phase | Volt | Bore size | | Max. Head | Max. Flow | | | |
| | PD | PD-F | | KW(HP) | PH | V | Inlet inch(mm) | Outlet inch(mm) | m | m ³ /min | | | |
| 50 | GPD-132 | GPD-132F | 1.0 | 0.75(1) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 12 | 0.20 | 26 | 374 | 625 |
| | GPD-232 | GPD-232F | 1.0 | 1.5(2) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 18 | 0.36 | 34 | 374 | 704 |
| | GPD-332 | GPD-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 2"(50) | 21 | 0.44 | 42 | 374 | 704 |
| | GPD-532 | GPD-532F | 1.0 | 3.7(5) | 3 | 220~480 | 2"(50) | 2"(50) | 26 | 0.44 | 56 | 420 | 780 |
| | GPD-532L | GPD-532LF | 1.0 | 3.7(5) | 3 | 220~480 | 3"(80) | 3"(80) | 24 | 0.68 | 86 | 425 | 830 |
| 60 | GPD-132 | GPD-132F | 1.0 | 0.75(1) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 10 | 0.19 | 26 | 374 | 625 |
| | GPD-232 | GPD-232F | 1.0 | 1.5(2) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 20 | 0.38 | 34 | 374 | 704 |
| | GPD-332 | GPD-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 2"(50) | 24 | 0.48 | 42 | 374 | 704 |
| | GPD-532 | GPD-532F | 1.0 | 3.7(5) | 3 | 220~480 | 2"(50) | 2"(50) | 28 | 0.60 | 56 | 420 | 780 |
| | GPD-532L | GPD-532LF | 1.0 | 3.7(5) | 3 | 220~480 | 3"(80) | 3"(80) | 28 | 0.68 | 86 | 425 | 830 |

GPD ·GPD-F Type PERFORMANCE CURVE

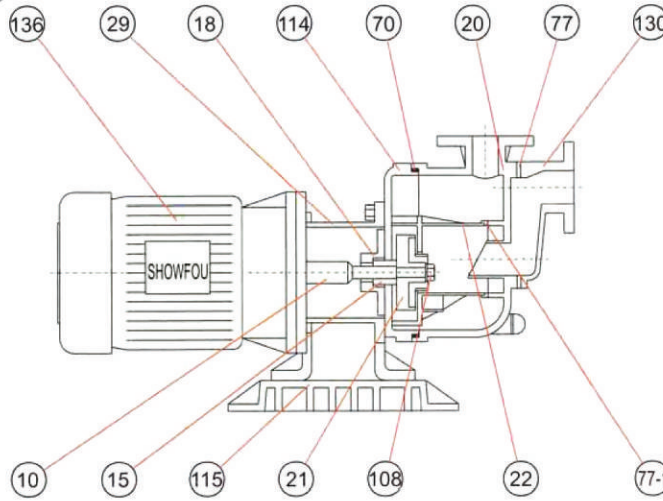




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GPD/GPD-F

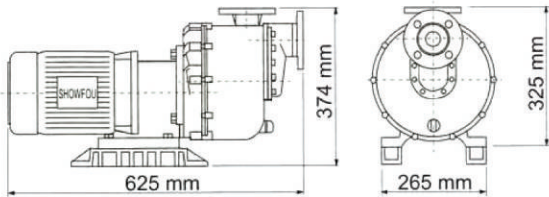
STRUCTURE



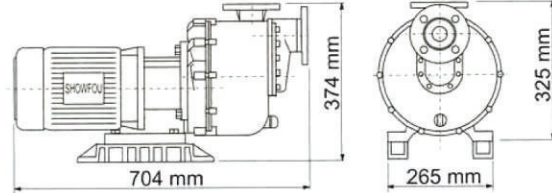
| No. | Name | Material | | Q'TY |
|------|------------------|-------------------------------------|---------------------|------|
| | | PD | PD-F | |
| 10 | Shaft | SUS304 + TEFLON | | 1 |
| 15 | Mechanical seal | (TEFLON) Ceramic+Carbon | (TEFLON) SiC+SiC | 1 |
| 18 | Seal cover | FRPP | PVDF | 1 |
| 20 | Pump casing | FRPP | PVDF | 1 |
| 21 | Impeller | FRPP | PVDF | 1 |
| 22 | Suction cove | FRPP | PVDF | 1 |
| 29 | Pump bracket | FRPP(1HP,2HP,3HP) Cast iron(5HP) | | 1 |
| 70 | O-Ring | EPDM | VITON | 1 |
| 77 | Packing | EPDM | VITON | 1 |
| 77-1 | Flap valve | EPDM | VITON | 1 |
| 108 | Nut | FRPP | PVDF | 1 |
| 114 | Pump lower cover | FRPP | PVDF | 1 |
| 115 | Frame | FRPP | | 2 |
| 136 | Motor | Cast iron | | 1 |
| 130 | Diffuser | FRPP | PVDF | 1 |

DIMENSIONS

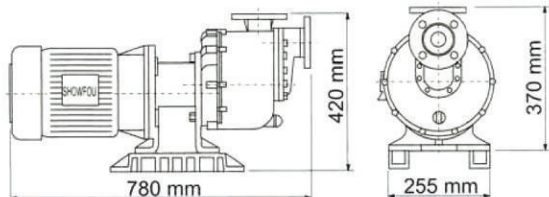
**GPD-132
GPD-132F**



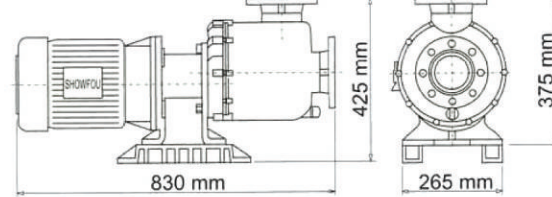
**GPD-232/332
GPD-232F/332F**



**GPD-532
GPD-532F**



**GPD-532L
GPD-532LF**



GPD-532



GPD-532L

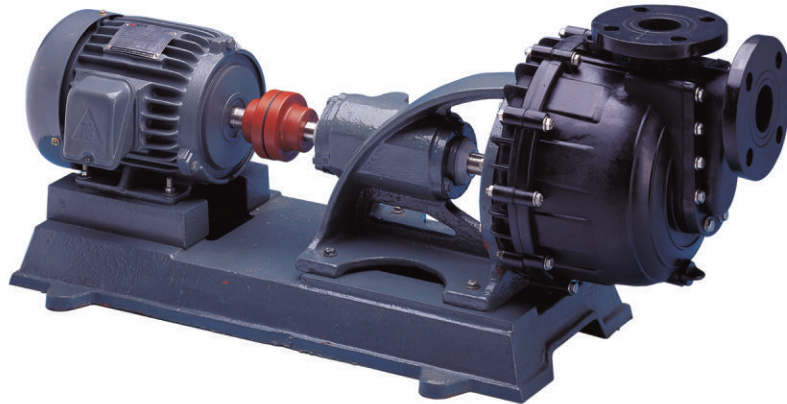


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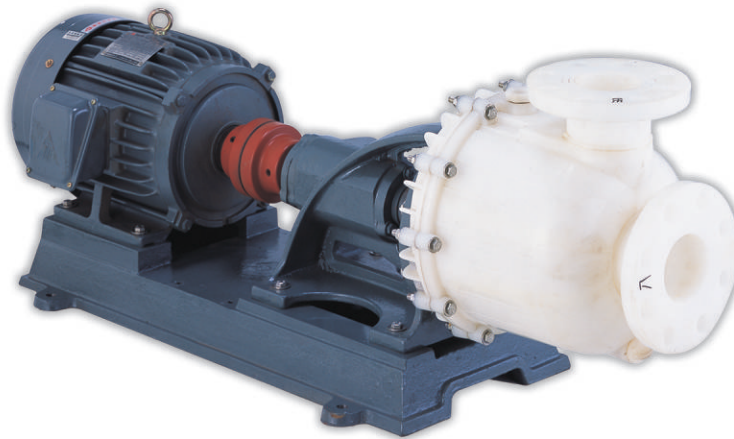
GPL/GPL-F

Self-Priming
Chemical Pump

GPL TYPE (FRPP)



GPL-F TYPE (PVDF)



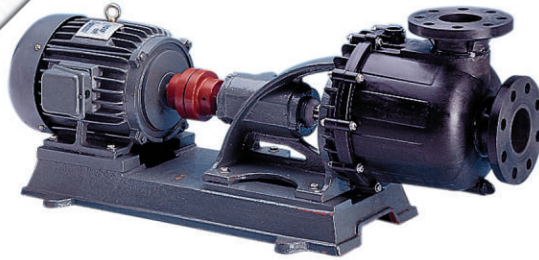
- * Equipped with Teflon Bellow Seal
- * The weight of motor are not included.
- * Especially design for electroplating industries.
- * The motors of PUPL-F need to be ordered separately.



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GPL/GPL-F

GPL Type (FRPP)



GPL-F Type (FRPP)

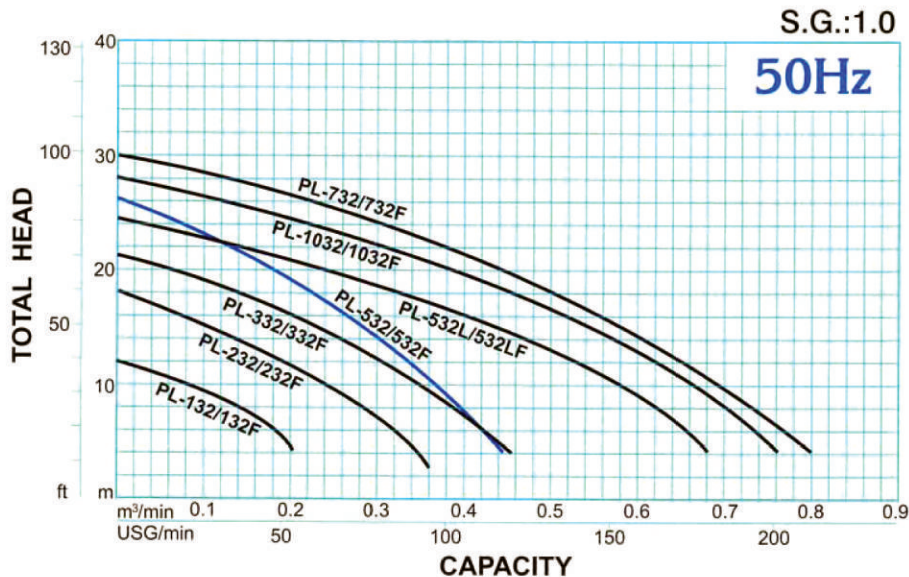


GPL · GPL-F Type SPECIFICATIONS (Without motor)

| Hz | Type | | S.G | Motor | | | Pump | | | ※ Weight kg | Height mm | Pump Dia mm | |
|----|----------|------------|-----|------------|-------|---------|----------------|-----------------|-----------|----------------|--------------|----------------|---------------------|
| | FRPP | PVDF | | Power | Phase | Volt | Bore size | | Max. Head | | | | Max. Flow |
| | PL | PL-F | | KW(HP) | PH | V | Inlet inch(mm) | Outlet inch(mm) | m | | | | m ³ /min |
| 50 | GPL-132 | G PL-132F | 1.0 | 0.75(1) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 12 | 0.20 | 44 | 413 | 1140 |
| | GPL-232 | G PL-232F | 1.0 | 1.5(2) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 18 | 0.36 | 44 | 413 | 1140 |
| | GPL-332 | G PL-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 2"(50) | 21 | 0.44 | 45 | 413 | 1140 |
| | GPL-532 | G PL-532F | 1.0 | 3.7(5) | 3 | 220~480 | 2"(50) | 2"(50) | 26 | 0.44 | 48 | 413 | 1140 |
| | GPL-532L | G PL-532LF | 1.0 | 3.7(5) | 3 | 220~480 | 3"(80) | 3"(80) | 24 | 0.68 | 49 | 413 | 1140 |
| | GPL-732 | G PL-732F | 1.0 | 5.5(7 1/2) | 3 | 220~480 | 3"(80) | 3"(80) | 28 | 0.75 | 53 | 413 | 1140 |
| | GPL-1032 | G PL-1032F | 1.0 | 7.5(10) | 3 | 220~480 | 3"(80) | 3"(80) | 30 | 0.80 | 53 | 413 | 1140 |
| 60 | GPL-132 | G PL-132F | 1.0 | 0.75(1) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 10 | 0.19 | 44 | 413 | 1140 |
| | GPL-232 | G PL-232F | 1.0 | 1.5(2) | 3 | 220~480 | 1 1/2"(40) | 1 1/2"(40) | 20 | 0.38 | 44 | 413 | 1140 |
| | GPL-332 | G PL-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 2"(50) | 24 | 0.48 | 45 | 413 | 1140 |
| | GPL-532 | G PL-532F | 1.0 | 3.7(5) | 3 | 220~480 | 2"(50) | 2"(50) | 28 | 0.6 | 48 | 413 | 1140 |
| | GPL-532L | G PL-532LF | 1.0 | 3.7(5) | 3 | 220~480 | 3"(80) | 3"(80) | 28 | 0.68 | 49 | 413 | 1140 |
| | GPL-732 | G PL-732F | 1.0 | 5.5(7 1/2) | 3 | 220~480 | 3"(80) | 3"(80) | 35 | 0.73 | 53 | 413 | 1140 |
| | GPL-1032 | G PL-1032F | 1.0 | 7.5(10) | 3 | 220~480 | 3"(80) | 3"(80) | 40 | 0.92 | 53 | 413 | 1140 |

※The weight of motor are not included.

GPL · GPL-F Type PERFORMANCE CURVE

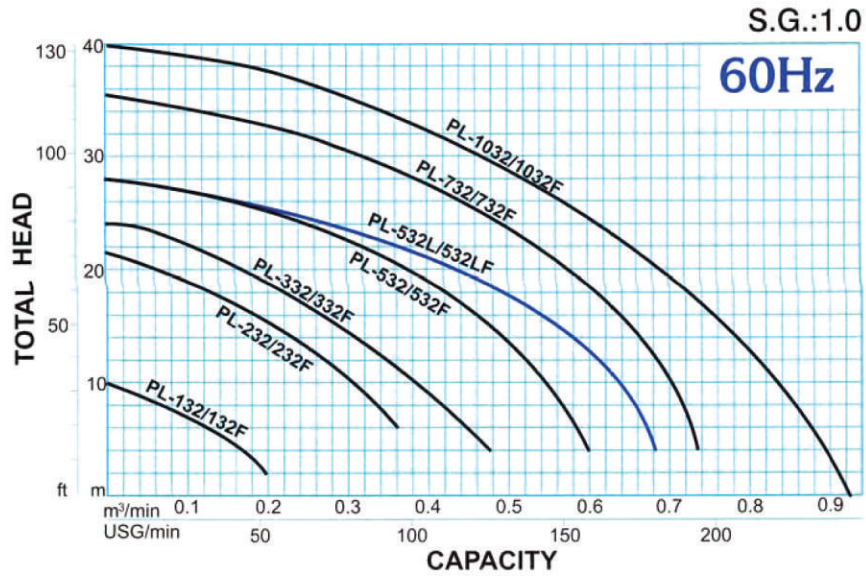




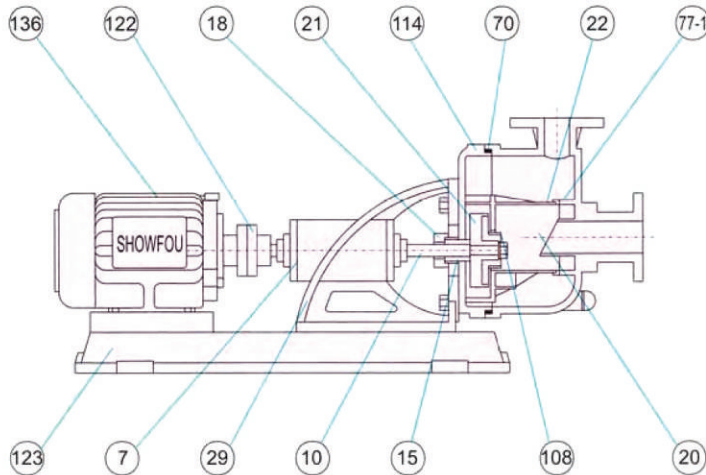
G.P.T. CO

GPL/GPL-F

GPL · GPL-F Type PERFORMANCE CURVE



STRUCTURE



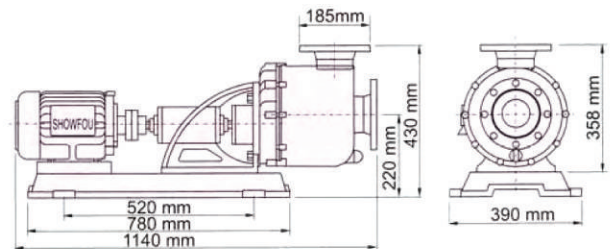
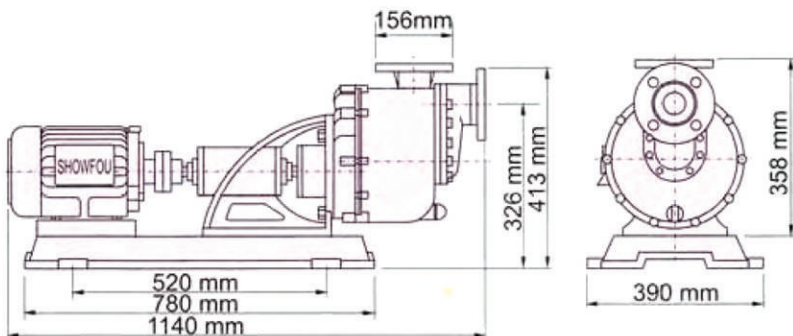
GPL · GPL-F Type

| No. | Name | Material | | Q'TY |
|------|------------------|----------------------------|---------------------|------|
| | | PL | PL-F | |
| 7 | Bearing | | | 2 |
| 10 | Shaft | SUS304 + TEFLON | | 1 |
| 15 | Mechanical seal | (TEFLON) Ceramic+Carbon | (TEFLON) SiC+SiC | 1 |
| 18 | Seal cover | FRPP | PVDF | 1 |
| 20 | Pump casing | FRPP | PVDF | 1 |
| 21 | Impeller | FRPP | PVDF | 1 |
| 22 | Suction cover | FRPP | PVDF | 1 |
| 29 | Pump bracket | Cast iron | | 1 |
| 70 | O-Ring | EPDM | VITON | 1 |
| 77 | Racking | EPDM | VITON | 1 |
| 77-1 | Flap valve | EPDM | VITON | 1 |
| 108 | Nut | FRPP | PVDF | 1 |
| 114 | Pump lower cover | FRPP | PVDF | 1 |
| 122 | Coupling | FC + Rubber | | 2 |
| 123 | Base | Cast iron Casing | | 1 |
| 136 | Motor | Cast iron Casing | | 1 |

DIMENSIONS

GPL-132/232/332/532

GPL-132F/232F/332F/532F



GPL-532L/732L/1 032L
GPL-532LF/732F/1 032F



G.P.T. CO

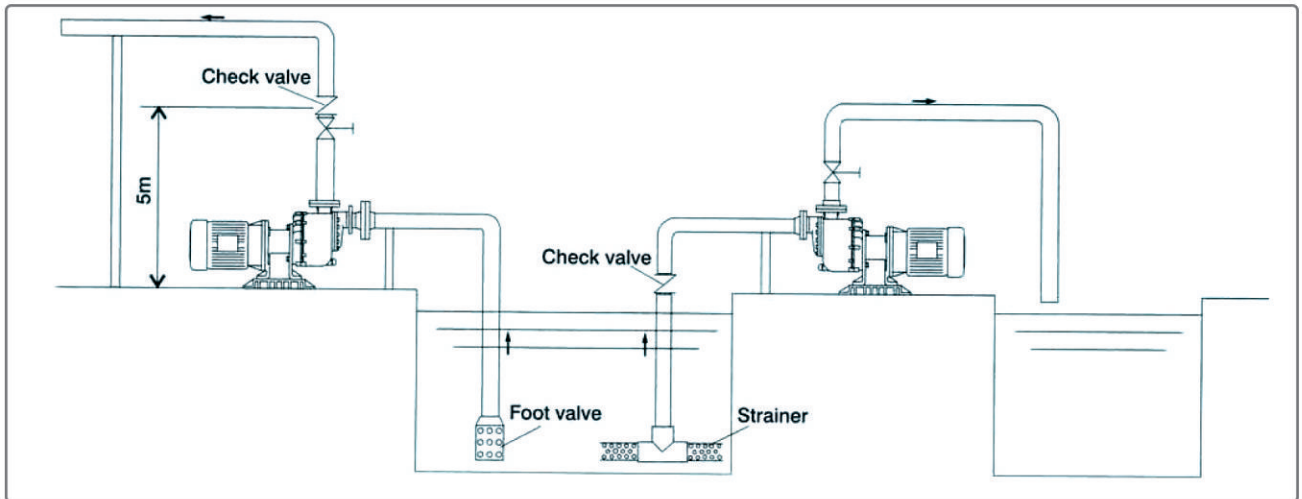
GPL/GPL-F

APPLICATIONS

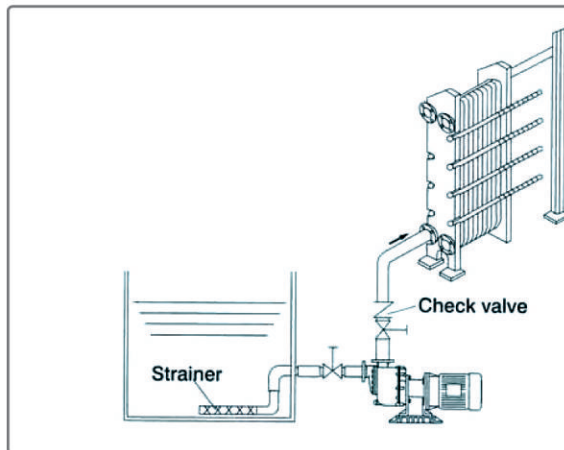
- Wasted and polluted water treatment.
- PCB electronic industry brick kiln industry.
- Paper industry, leather industry, dyeing and textile.
- Surface electric plated industry.
- Chemical engineering industry.
- Medical and pharmaceutical industry and food industry.

INSTALLATION NOTICE

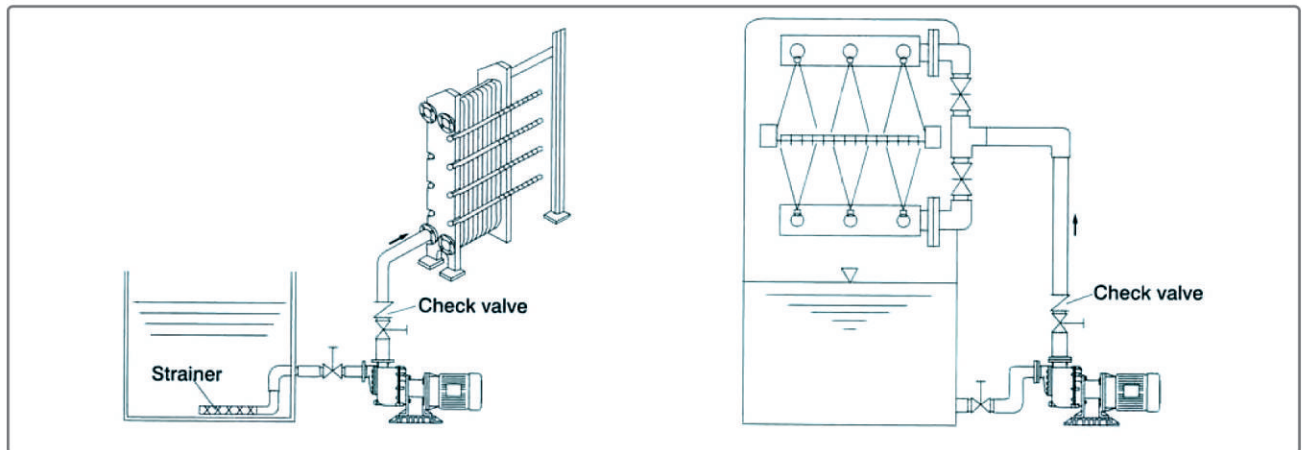
Transfer for tank to tank



Heat exchanger circulation



PCB washing pumps for etching machine



1. For the first installation, please fill the pump with the liquid to prevent the mechanical seal damage.
2. Lay down a strainer at the suction inlet of pipe to avoid incoming rubbish and foreign matter, and we also recommend you to use a foot valve at the suction inlet of pipe to get even better performance.
3. Place a check valve at discharge pipe line and air bypass under the check valve in order to avoid breakage by water hammer.
4. In case of high temperature liquid over 40°C, place flexible joints and bending in pipe line to avoid piping load to pump by pipe's expansion.
Avoid deformation of pump by over-tightening when using a flexible joint, a loose flange made of metal or an inner packing on the piping line.
5. Place each flange surface of pipe and pump in parallel and do not over-tightening by bolts.
6. Use resin pipe, avoid metal pipe as much as possible.



G.P.T.CO

GPE/GPE-F/GPEB

Dry Free Vertical Sealless Pump

GPE TYPE (FRPP)



GPE-F TYPE (FRPP)

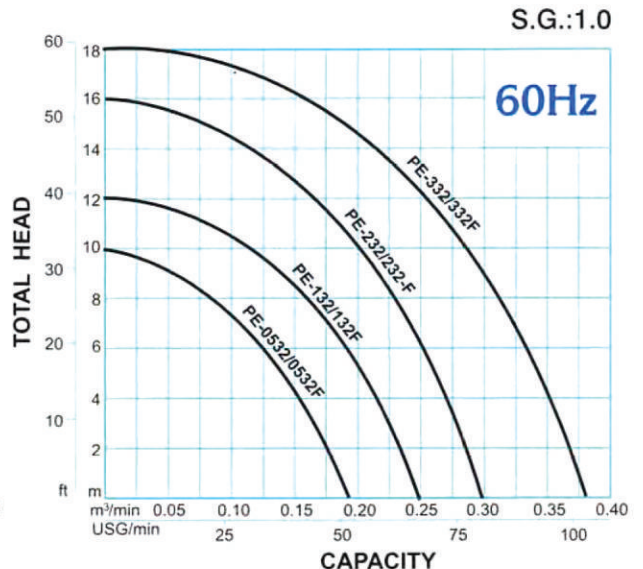
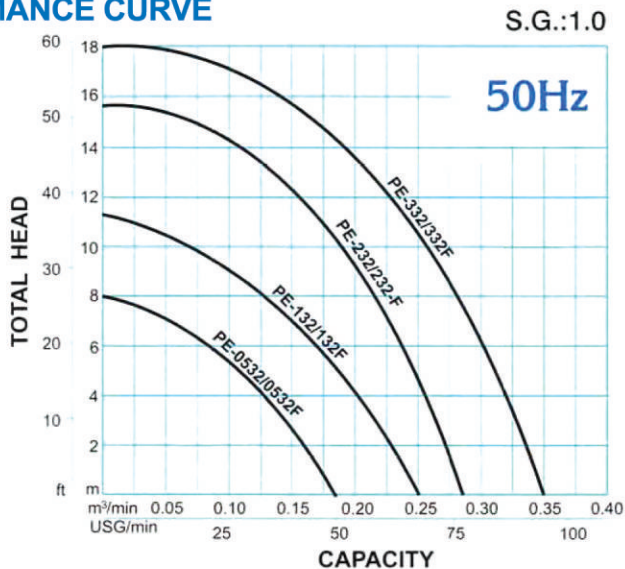


GPEB TYPE (FRPP)

GPE · GPE-F Type SPECIFICATIONS

| Hz | Type | | S.G | Motor | | | Pump | | | | Weight kg | Height mm | Pump Dia mm |
|----|----------|-----------|-----|----------|-------|---------|-------------------|--------------------|-----------|---------------------|--------------|--------------|----------------|
| | FRPP | PVDF | | Power | Phase | Volt | Bore size | | Max. Head | Max. Flow | | | |
| | PE | PE-F | | KW(HP) | PH | V | Inlet inch(mm) | Outlet inch(mm) | m | m ³ /min | | | |
| 50 | GPE-0532 | GPE-0532F | 1.0 | 0.4(1/2) | 3 | 220~480 | 2"(50) | 1"(25) | 7 | 0.18 | 19.4 | 536 | 221 |
| | GPE-132 | GPE-132F | 1.0 | 0.75(1) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 10 | 0.25 | 20 | 530 | 221 |
| | GPE-232 | GPE-232F | 1.0 | 1.5(2) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 14 | 0.28 | 23 | 610 | 221 |
| | GPE-332 | GPE-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 16 | 0.35 | 35 | 610 | 221 |
| 60 | GPE-0532 | GPE-0532F | 1.0 | 0.4(1/2) | 3 | 220~480 | 2"(50) | 1"(25) | 10 | 0.19 | 19.4 | 536 | 221 |
| | GPE-132 | GPE-132F | 1.0 | 0.75(1) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 12 | 0.25 | 20 | 530 | 221 |
| | GPE-232 | GPE-232F | 1.0 | 1.5(2) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 16 | 0.30 | 23 | 610 | 221 |
| | GPE-332 | GPE-332F | 1.0 | 2.2(3) | 3 | 220~480 | 2"(50) | 1 1/2"(40) | 18 | 0.38 | 35 | 610 | 221 |

GPE · GPE-F Type PERFORMANCE CURVE



- * Capable for Dry Running.
- * Especially design for electroplating industries.



G.P.T. CO

GPL/GPL-F

Pumps with New Sealless Structure Design and Adopting Unique lip Seal Feature to give Pump Dry Running Ability.



GPE-F Type
(PVOF)



GPE Type
(FRPP)



GPEB Type
(FRPP)

Material

Gol pump provide FRPP and PVDF pump body to meet customer's requirement.

FRPP : Fiber Reinforced Polypropylene.

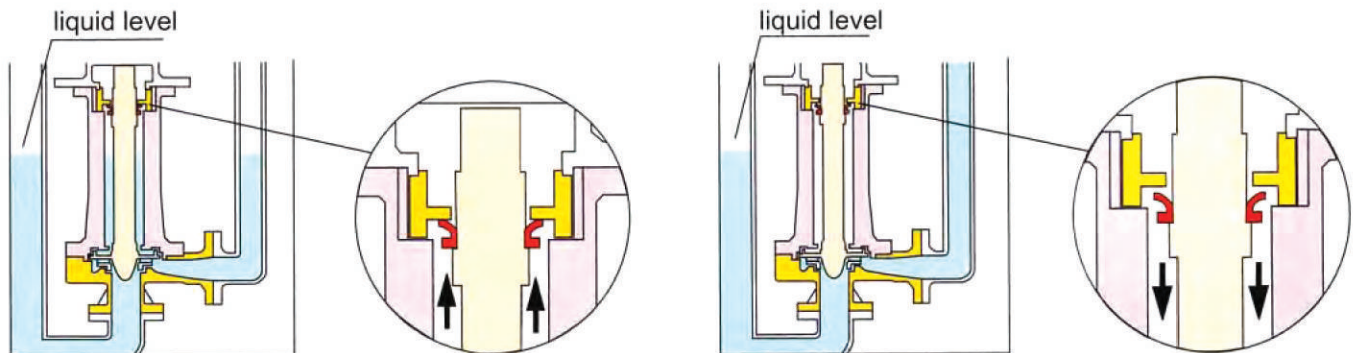
| | | |
|-----------------------------|------|------------|
| Operating temperature range | FRPP | 0°C~90°C |
| | PVDF | -20°C~95°C |

FEATURES

Sealless structure

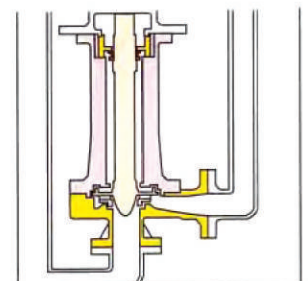
The sealless principal of fluid in our Showfou vertical sealless pump is to utilize the pressure, viscosity, and friction of the fluid.

During running, the fluid flowing to shaft caused by inner pressure. but the specially designed two-layered impeller enables to seal up the fluid successfully and reduce the suction air to enter the pump; thus, the inner will keep high vacuum situation.



Dry cunning ability

Superior construction design, there is no any contact between the pump body and the impeller. Owing to no any friction caused in running, the long period dry running will not cause any damage with pump.



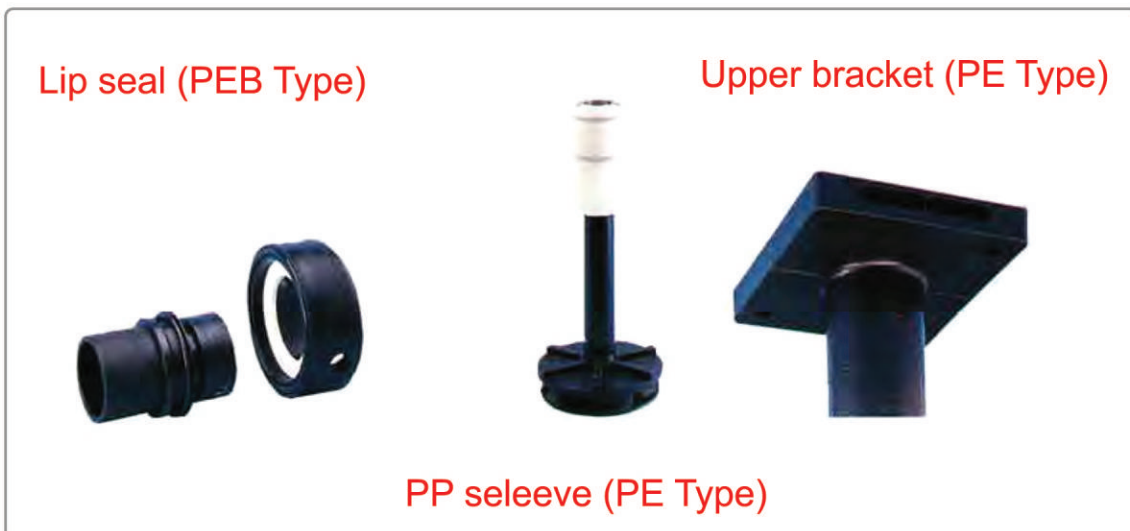


G.P.T. CO

GPL/GPL-F

Lip seal structure and PP sleeve

To prevent chemical gas entering to motor shaft, Our Showfou solution is to equip PEB type with a lip seal, so when the pump is in operation, the lip seal is forced to open by centrifugal force in order to stop the gas leakage. When stop, the lip seal will close up to seal up the chemical gas due to reactive force of its rubber. Moreover, an additional part of oil seal on motor will protect the shaft as well. However, for our PE type, the main shaft and motor are protected by the PP sleeve and oil seal, so the leaked gas will be perished immediately due to the special upper bracket design which can also solve the liquid overflow problem.



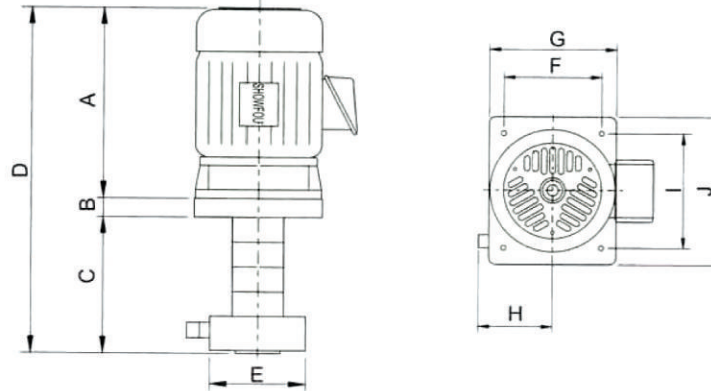


G.P.T.CO

GPL/GPL-F

DIMENSIONS

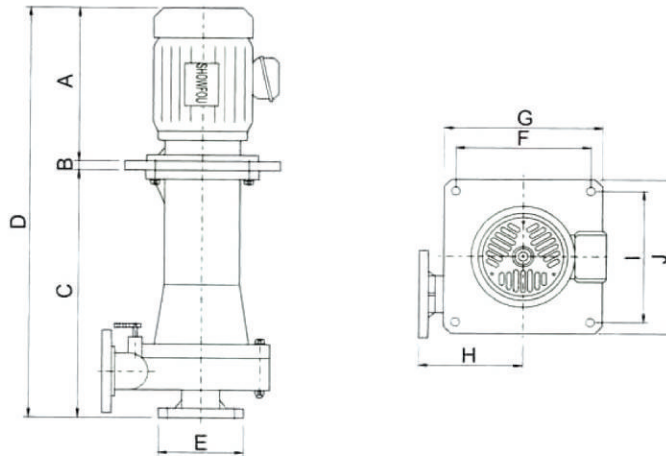
PE · PE-F Type



UNIT : mm

| Type | | Bore size | | A | B | C | D | E | F | G | H | I | J |
|----------|-----------|-----------|--------|-------|----|-----|-------|-----|-----|-----|-----|-----|-----|
| FRPP | PVDF | Inlet | Outlet | | | | | | | | | | |
| GPE-0532 | GPE-0532F | 50 | 25 | 240 | 30 | 266 | 536 | 143 | 147 | 195 | 118 | 179 | 233 |
| GPE-132 | GPE-132F | 50 | 40 | 234 | 30 | 266 | 530 | 143 | 147 | 195 | 118 | 179 | 233 |
| GPE-232 | GPE-232F | 50 | 40 | 313.5 | 30 | 266 | 609.5 | 143 | 147 | 195 | 118 | 179 | 233 |
| GPE-332 | GPE-332F | 50 | 40 | 313.5 | 30 | 266 | 609.5 | 143 | 147 | 195 | 118 | 179 | 233 |

PEB Type



UNIT : mm

| Type | | Bore size | | A | B | C | D | E | F | G | H | I | J |
|-----------|--|-----------|--------|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| FRPP | | Inlet | Outlet | | | | | | | | | | |
| GPEB-332 | | 50 | 40 | 313 | 23 | 426 | 762 | 340 | 222 | 268 | 200 | 222 | 268 |
| GPEB-532 | | 65 | 50 | 362 | 23 | 426 | 811 | 340 | 222 | 268 | 200 | 222 | 268 |
| GPEB-532L | | 80 | 80 | 362 | 23 | 426 | 811 | 340 | 222 | 268 | 200 | 222 | 268 |
| GPEB-732 | | 80 | 80 | 376 | 23 | 426 | 825 | 340 | 300 | 350 | 200 | 300 | 350 |
| GPEB-332P | | 80 | 50 | 362 | 23 | 426 | 762 | 340 | 222 | 268 | 200 | 222 | 268 |
| GPEB-532P | | 80 | 80 | 362 | 23 | 426 | 811 | 340 | 222 | 268 | 200 | 222 | 268 |
| GPEB-732P | | 80 | 80 | 376 | 23 | 426 | 825 | 340 | 300 | 350 | 200 | 300 | 350 |

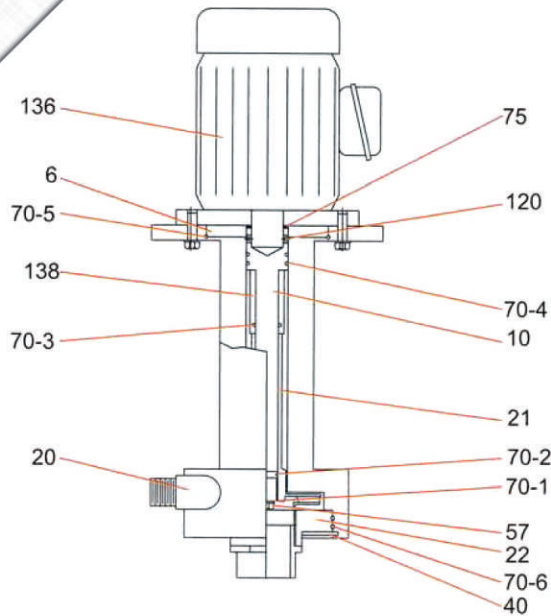


G.P.T. CO

GPL/GPL-F

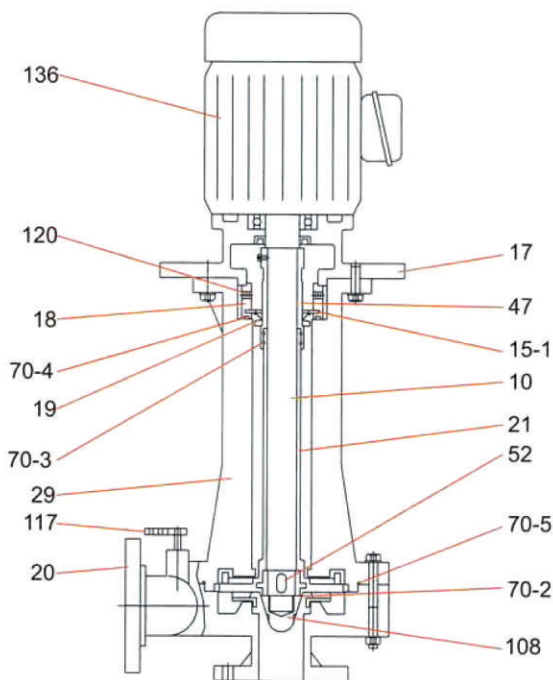
FEATURES

PE · PE-F Type



| No. | Name | Material | | Q'TY |
|------|---------------|------------------|-------|------|
| | | PE | PE-F | |
| 6 | Upper Bracket | FRPP | PVDF | 1 |
| 10 | Shaft | SUS 304 | | 1 |
| 20 | Pump Casing | FRPP | PVDF | 1 |
| 21 | Impeller | FRPP | PVDF | 1 |
| 22 | Suction Cove | FRPP | PVDF | 1 |
| 40 | Spring | FRPP | PVDF | 1 |
| 57 | Bolt | FRPP | PVDF | 1 |
| 70-1 | O-ring | EPDM | VITON | 1 |
| 70-2 | O-ring | EPDM | VITON | 1 |
| 70-3 | O-ring | EPDM | VITON | 1 |
| 70-4 | O-ring | EPDM | VITON | 2 |
| 70-5 | O-ring | EPDM | VITON | 1 |
| 70-6 | O-ring | EPDM | VITON | 2 |
| 75 | Shaft Rubber | EPDM | VITON | 1 |
| 120 | Bolt | SUS 304 | | 1 |
| 136 | Motor | Cast iron casing | | 1 |
| 138 | Sleeve | PP | PP | 1 |

PEB Type



| No. | Name | Material | Q'TY |
|------|-------------------|--|------|
| | | PEB | |
| 10 | Shaft | SUS 304 | 1 |
| 15-1 | Seal case ring | Ceramic | 1 |
| 17 | Motor lower cover | FRPP (3HP, 5HP) Cast iron (7 1/2HP) | 1 |
| 18 | Seal cover | FRPP | 1 |
| 19 | Vapor seal | VITON | 1 |
| 20 | Pump casing | FRPP | 1 |
| 21 | Impeller | FRPP | 1 |
| 29 | Pump Bracket | FRPP | 1 |
| 47 | Band-cable-fixed | FRPP | 1 |
| 52 | Key | SUS 304 | 1 |
| 57-2 | Bolt | SUS 304 | 8 |
| 57-3 | Bolt | SUS 304 | 8 |
| 67 | Nut | SUS 304 | 8 |
| 70-2 | O-ring | VITON | 1 |
| 70-3 | O-ring | VITON | 2 |
| 70-4 | O-ring | VITON | 1 |
| 70-5 | O-ring | VITON | 1 |
| 77 | Packing | VITON | 1 |
| 108 | Nut | FRPP | 1 |
| 117 | Air valve | FRPP | 1 |
| 120 | Bolt | SUS 304 | 2 |
| 136 | Motor | Cast iron casing | 1 |



G.P.T. CO

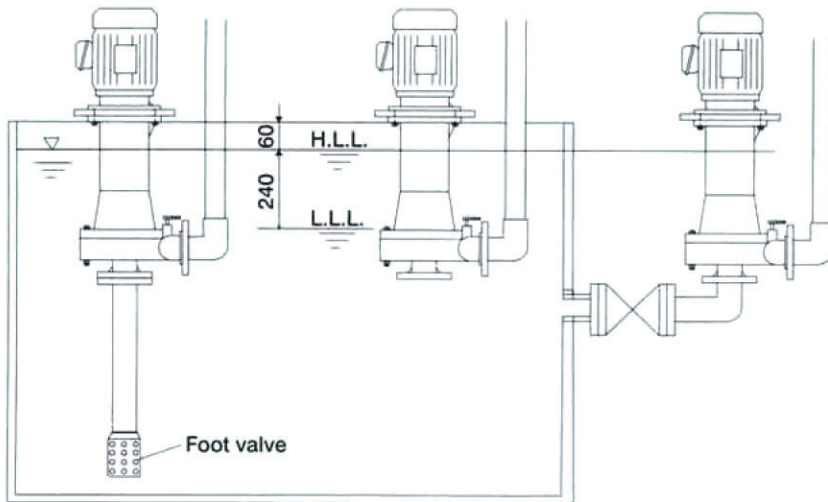
GPL/GPL-F

APPLICATIONS

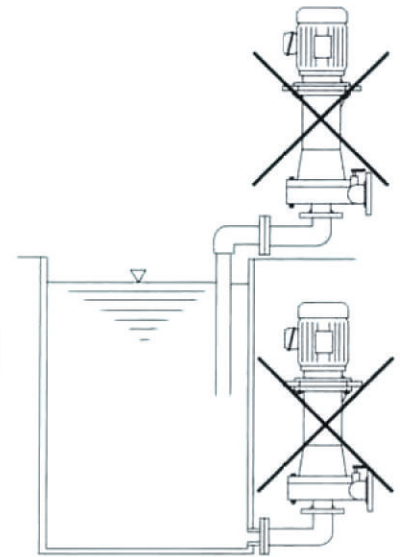
- Transferring and circulating for plating solvents of filter.
- Heat exchanger circulation.
- Press and reaction tank transfer.
- Reaction mixing tank circulation.
- Nickel plating liquid.
- Transfer for tank to tank.
- For etching spray pump.
- Out of tank use for Filter.
- High temperature and chemical liquid with particles can be used limitedly, such as : chemical cuprem, potassium manganate, plating gold liquid and non-electrolytic-nickel plating solvents etc ..

INSTALLATION NOTICE

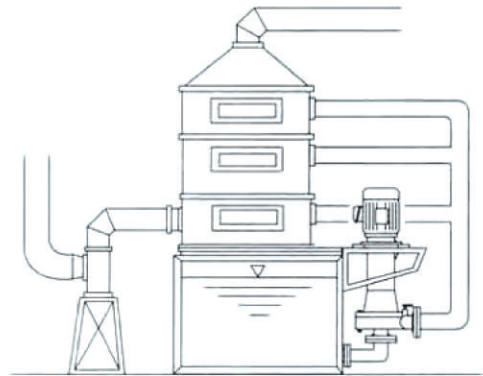
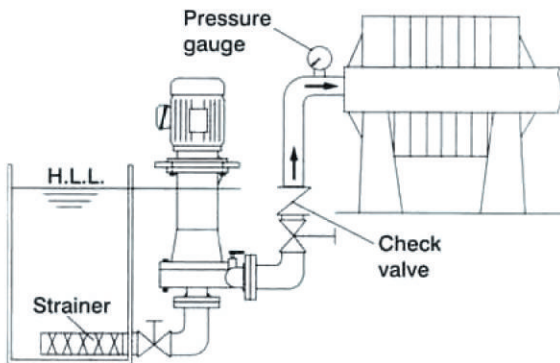
H.L.L. : Highest Liquid Level
L.L.L. : Lowest Liquid Level



Transferring pumps for reactor and filtering press



Chemical waste gas cleaning tower



1. When starting, The liquid level must above L.L.L.
Please notice the liquid level do not over H.L.L.
2. To use PEB pump inside the tank, please use Titanium, PPS or HTPVC bolts and nuts for the pump body.
3. Lay down a strainer at the suction inlet of pipe to avoid incoming rubbish and foreign matter.
 - Place a check valve at discharge pipe line and air bypass pipe under the check valve in order to avoid breakage by water hammer.